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IS 7927 (1975): Method of field testing for manually operated paddy weeder [FAD 21: Farm Implements and Machinery]



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METHOD OF FIELD TESTING FOR
MANUALLY-OPERATED PADDY WEEDER

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METHOD OF FIELD TESTING FOR MANUALLY-OPERATED PADDY WEEDER

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Indian Standard

METHOD OF FIELD TESTING FOR MANUALLY-OPERATED PADDY WEEDER

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 28 November 1975, after the draft finalized by the Farm Power and Machinery Sectional Committee had been approved by the Agricultural and Food Products Division Council.

0.2 Paddy weeders are used for eradication of weeds in paddy fields. 'Indian Standard Specification for rotary paddy weeders' (IS : 1976-1969) has already been issued. It was felt that a detailed method for field testing of paddy weeders should also be prepared as the utility and acceptance of a paddy weeder depends upon its performance. This standard is prepared to achieve this objective.

0.3 In reporting the result of a test, made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard prescribes method of field testing for manually-operated paddy weeder.

2. SELECTION OF WEEDERS FOR TEST

2.1 The paddy weeder shall be taken from the series production by the testing authority with the agreement of the manufacturer. The manufacturer shall supply all literature and specification sheet as given in Appendix A duly filled in.

*Rules for rounding off numerical values (*revised*).

3. TESTS

3.1 General Tests

- a) Checking of specifications (*see* 4.1), and
- b) Checking of material (*see* 4.2).

3.2 Field Tests (*see* 6)

3.2.1 Short-Run Test (*see* 6.1)

- a) Effective width of weeding (*see* 6.1.1),
- b) Field efficiency (*see* 6.1.2),
- c) Power requirement (*see* 6.1.3), and
- d) Weeding efficiency (*see* 6.1.4).

3.2.2 Long-Run Test (*see* 6.2)

4. GENERAL TESTS

4.1 Checking of Specification — Check all the dimensions and specification mentioned by the manufacturer (*see* 2.1) and record the data in Specification Sheet given in Appendix A.

4.2 Checking of Material — Check the material for all components and record the data in Data Sheet given in Appendix B.

5. PREPARATION OF WEEDER FOR FIELD TEST AND SELECTION OF LAND

5.1 Initial Preparations

- a) Check fasteners,
- b) Lubricate the parts which require lubrication, and
- c) Operate the weeder for sometime to get acquainted with the handling of the weeder under field conditions.

5.2 Selection of Test Plot

5.2.1 Size of Plot — For uniformity of working, the minimum size of field may be fixed as 10×10 metres.

5.2.2 Type of Soil — The paddy weeder should be tested in paddy growing field to eliminate variations in test result due to soil factors. The type of soil should be determined on the basis of mechanical analysis of the soil of the test plot.

5.2.3 Depth of Standing Water — The depth of water to be allowed at the time of weeding may be 2.5 mm for facilitating the cleaning operation and effective elimination of weed.

5.2.4 Weed Population — It is difficult to control the population of weeds but their average number per square metre may be recorded. One metre square frame may be used for measuring weed population. Counts from 10 random places should be taken and the average number should be determined.

5.2.5 Size of Weed — The size of different weeds is also an important factor affecting performance of paddy weeder. The size may be determined by counting weeds per kilogram of mass of each type. The average of five at random counts may be taken as representative of the field.

5.2.6 Stage of Maturity — The stage of maturity refers to the growth of the paddy crop. Vigorous growth will hinder the effective use of paddy weeder. Direct sown crop may be weeded at tenth, twentieth or thirtieth day after the date of germination. In case of transplanted paddy field, the weeding should be done on twentieth, thirtieth or fortieth day from the date of planting.

5.2.7 Row Spacing of Crop — In case of direct sown paddy, the row to row distance should be 200 mm. In case of transplanted paddy, row to row and plant to plant distance should be 150 mm.

5.2.8 Other Conditions — Any other special condition located at the site should also be reported.

5.2.9 Record the observations in Data Sheet given in Appendix C.

6. FIELD TESTS

6.1 Short Run

6.1.1 Effective Width of Weeding — Measure the effective width of weeder which shall be the effective width of weeding. In case of weeder having provision for width adjustment, the minimum and maximum width shall be measured.

6.1.2 Field Efficiency

6.1.2.1 Field efficiency is the ratio of effective field capacity to theoretical field capacity expressed as percent.

6.1.2.2 The theoretical field capacity in hectares per hour can be calculated from the speed of weeding and width of weeding (*see 6.1.1*). It is the rate of field coverage that would be obtained if the weeder was

operating continuously without interruptions. The speed of weeding should be obtained by following method:

- a) Mark each end of row leaving allowance for starting the operation and measure the length of row.
- b) Operate the weeder and make sure it is operating smoothly.
- c) Record the time for the weeder to traverse the marked length of row.
- d) Calculate the speed of travel in km/h. Also calculate the number of stroke per metre of row length.

6.1.2.3 The effective field capacity is the actual average rate of coverage. It includes turning at the end of rows, choking, making adjustments, etc. It is recorded in hectares/hour.

6.1.3 Power Requirement — The power required to operate the weeder may be roughly measured with the help of average pull or push, the distance covered during each pull or push and the number of to and fro motions per unit time. The pull or push should be measured by use of a spring balance. The average distance covered during each stroke should also be measured. The average number of forward and backward strokes made during every 5-minute period can be recorded.

6.1.4 Weeding Efficiency — The average number of weeds present per square metre area before weeding should be determined. In the similar manner the number of weeds left out per square metre can be counted 5 days after the weeding test is completed. The difference of the two will give the number of weeds eliminated and the efficiency of weeder can be computed as follows:

$$\text{Weeding efficiency} = \frac{\text{Number of weeds eliminated per m}^2}{\text{Total number of weeds present per m}^2} \times 100$$

6.2 Long-Run Test — The paddy weeder shall be operated in the field for a minimum period of 30 hours. During and after this period, the assessment of the weeder should be made visually.

6.3 Record the observations in Data Sheet given in Appendix C.

7. SUMMARY REPORT

7.1 For reducing the data to a readily usable form, compile a summary report as given in Appendix D.

APPENDIX A
(Clauses 2.1 and 4.1)
SPECIFICATION SHEET

TO BE FILLED BY

Manufacturer

Testing Station

1. NAME OF THE IMPLEMENT
2. MAKE
3. MODEL NUMBER
4. TYPE (SINGLE OR DOUBLE ROW)
5. MASS
6. TYPE OF SOIL WORKING PART
7. NUMBER AND DIAMETER OF DRUM
8. LENGTH OF SPIKE
9. NUMBER OF SPIKES IN ONE DRUM
10. NUMBER OF SPIKES PER ROW
11. ARRANGEMENT OF SPIKES
12. RANGE OF ADJUSTMENT FOR DEPTH
AND WIDTH
13. TYPE OF HANDLE
14. OPTIMUM ANGLE OF INCLINATION
OF HANDLE TO HORIZONTAL
PLANE
15. NUMBER OF PERSONS NEEDED TO
OPERATE
16. SPECIAL FEATURES, IF ANY (FLOAT,
ETC.)

APPENDIX B

(Clause 4.2)

MATERIAL OF CONSTRUCTION DATA SHEET

1. DATE OF TEST
2. MATERIAL OF CONSTRUCTION:

<i>Sl No.</i>	<i>Component</i>	<i>Material</i>	<i>Size</i>	<i>Mass</i>
1	Frame			
2	Float			
3	Spike			
4	Drum			
5	Handle			
6	Arm piece			
7	Angle regulator			
8	Axle			
9	Bearing			
10	Grip			
11	Other			

NOTE 1 — Delete the component which is not applicable to a particular weeder and add if any other component is provided.

NOTE 2 — Last two columns should be recorded wherever feasible.

Testing Engineer

APPENDIX C

(*Clauses 5.2.9 and 6.3*)

FIELD TEST DATA SHEET

1. DATE OF TEST
2. SITE OF TEST
3. FIELD CONDITIONS:
 - a) Type of soil
 - b) Depth of standing water
 - c) Type of predominant weed
 - d) Weed population
 - e) Size of weeds
 - f) Stage of maturity of crop
 - g) Row spacing of crop
 - h) Size of test plot:
 - i) Length
 - ii) Width
4. TEST OBSERVATIONS:

Sl No.	Observations	Measurement Numbers						Average
		1	2	3	4	5	etc	
1	Effective width of operation							
2	Effective field capacity							
3	Length of the marked space							
4	Time taken to traverse marked space							
5	Length of forward stroke							
6	Length of backward stroke							
7	Force required for forward motion							
8	Force required for backward motion							
9	Distance moved per unit time in forward stroke							
10	Distance moved per unit time in backward stroke							
11	Number of weeds before test							
12	Number of weeds after test							

5. OTHER OBSERVATIONS:

- a) Fatigue of the operator
- b) Maximum time the operator can work continuously
- c) Ease of operation and adjustment
- d) Balancing of the weeder
- e) Any breakdown or bending of spikes
- f) Frequent clogging of the spikes
- g) Any other observations

Testing Engineer

APPENDIX D

(*Clause 7.1*)

SUMMARY REPORT

1. NAME OF MANUFACTURER
2. NAME OF PADDY WEEDER
3. TYPE OF PADDY WEEDER
4. WIDTH
5. EFFECTIVE FIELD CAPACITY
6. SPEED OF OPERATION
7. NUMBER OF STROKES PER METRE
8. THEORETICAL FIELD CAPACITY
9. FIELD EFFICIENCY
10. POWER REQUIRED
11. WEEDING EFFICIENCY
12. EASE OF HANDLING AND ADJUSTMENT
13. CONSTRUCTIONAL DURABILITY
14. ANY OTHER OBSERVATIONS

Testing Engineer

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AGRICULTURAL MACHINERY AND TRACTORS

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